

Application No. 10/628,305
Docket No. K06-159567M/TBS

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REMARKS

Entry of this Amendment is believed proper since no new issues are being raised which would require the Examiner's further consideration and/or search.

Claims 1-5 are all the claims presently pending in this application. Claims 1 and 3-4 have been previously withdrawn from examination.

The Abstract and Title of the Invention are objected to and Applicant has amended the Abstract and Title of the Invention in a manner believed fully responsive to all points raised by the Examiner.

Claim 2 stands rejected under 35 U.S.C. §102(b) as being anticipated by Goto, EP 1099869 A2 or Goto, U.S. Pat. No. 6,537,390.

Claim 5 stands rejected under 35 U.S.C. §103(a) as being obvious over Goto, EP 1099869 A2, further in view of Toda, U.S. Pat. No. 6,251,197.

Claims 2 and 5 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 5 of Application No. 10/293,368 as amended on April 14, 2006.

These rejections are respectfully traversed in view of the following discussion.

I. APPLICANT'S CLAIMED INVENTION

The claimed invention (as defined, for example, by independent claim 2) is directed to a roller member including a high carbon chromium bearing steel and having a carburization treatment, the bearing steel including a surface portion defined as a range between a surface of a rolling face of the rolling member to a depth where a maximum shearing stress acts thereon, the surface portion containing carbon in a total amount including a range of 1.0 to

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1.6 wt% and an amount of residual austenite including a range of 20 to 35 vol%, and compression residual stress of the surface portion includes a range of 150 to 1000 MPa. Furthermore, a surface hardness of the surface portion includes a range of 64 or higher in Rockwell C hardness, and an amount of carbide precipitate on the surface portion includes a range of 10 to 25% in an area rate and each carbide particle size includes a range of 3 μ m or less.

Conventionally, as a raw material, case hardened steel is not mass-produced, and material costs are high. As a result, heat treating costs for the carburization treatment or carbonitriding treatment of case hardened steel are expensive, and therefore a problem to the total production cost of the roller cam follower. (Application at page 2, lines 15-21.)

The claimed invention (e.g., as recited in claim 2), on the other hand, includes a roller member including high carbon chromium bearing steel and having a carburization treatment, wherein an amount of residual austenite includes a range of 20 to 35 vol% provides for proper hardness under severe wear conditions. (Specification at page 2, lines 8-12, and page 7, lines 3-13.)

II. THE ALLEGED PRIOR ART REJECTIONS

A. 35 U.S.C. § 102(b) Rejection over Goto, EP 1099869 A2 or Goto, U.S. Pat. No. 6,537,390

The Examiner alleges that Goto, EP 1099869 A2, (Goto '869), or Goto, U.S. Pat. No. 6,537,390, (Goto '390), teaches the invention of claim 2.

Applicant submits, however, that Goto '869 and '390 do not teach or suggest:

“a roller member comprising: high carbon chromium bearing steel having a carburization treatment, said bearing steel comprising: a surface portion defined as a range

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between a surface of a rolling face of the roller member to a depth where a maximum shearing stress acts thereon, said surface portion containing carbon in a total amount comprising a range of 1.0 to 1.6 wt% and an amount of residual austenite comprising a range of 20 vol% to 35 vol%, and

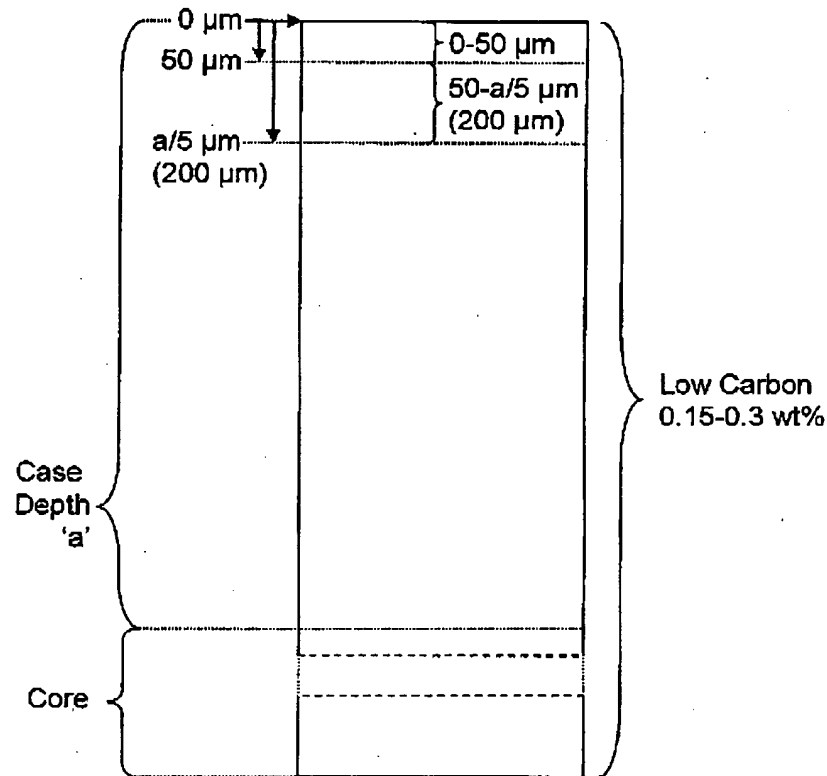
"wherein a surface hardness of said surface portion comprises a range of 64 or higher in Rockwell C hardness."

Goto '869 and '390 disclose a surface layer made from steel containing a 0.15 to 0.3 wt% carbon having two (2) layers with different properties: a first layer defined from the surface of the bearing to 50 μm ; and the second layer defined from 50 μm to 1/5 the case depth, or as defined in the Abstract of Goto '390, 200 μm . See diagram below of Goto '869 and '390.

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GOTO '869 & '390



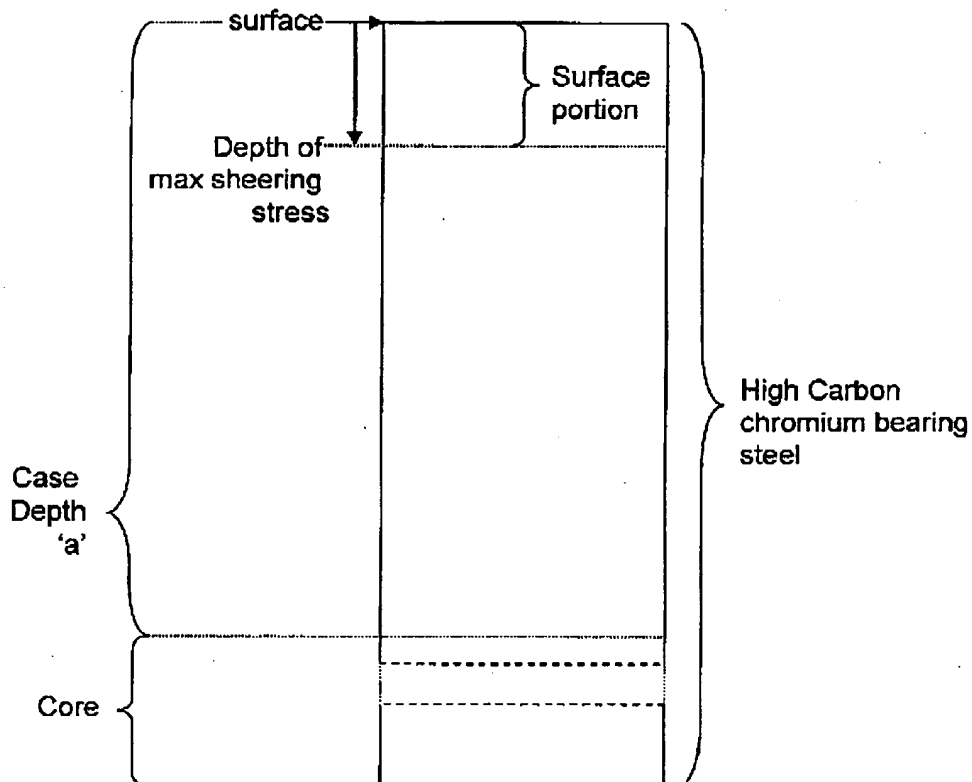
Goto '869 and '390 clearly teach that the bearing is made of steel material containing 0.15-0.3 wt.% carbon. Therefore, Goto '869 and '390 suggest that the core and remainder of the case depth not including 0-1/5 case depth (200) μm is comprised of low carbon steel having a 0.15-0.3 wt.% of carbon.

Applicant's claim 2 recites *a roller member comprising: high carbon chromium bearing steel*. As stated in a previous response to the Non-Final Office Action of January 23, 2006, and as well known in the art, high carbon chromium steel may contain 0.95 to 1.10 wt% of carbon, a carbon content well outside the range of 0.15-0.3 wt% of carbon. See diagram below which depicts an exemplary aspect of the claimed invention.

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Exemplary Aspect of the Claimed Invention



Goto '869 and '390 fails to teach or suggest that the first layer from 0-50 μm has *an amount of residual austenite comprising a range of 20-35 vol.%* as claimed by Applicant.

The Examiner states on page 7 of the Final Office Action that "Goto '869 teaches both the carbon content in residual austenite content in the same embodiment (both in abstract, lines 3-5 and in paragraph [0010])."

However, Applicant respectfully contends that Goto '869 only teaches a residual austenite content of 25-45% in the second layer of 50-1/5 case depth (or 200) μm . The neither Goto '869 and '390 teach or suggest any residual austenite content in the Abstract or lines 3-5. Paragraph [0010] of Goto '869 discloses 25-45% in residual austenite content with

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respect to the second layer of 50-1/5 case depth (or 200) μm , not the first layer of 0-50 μm .

Goto '869 and '390 fails to teach or suggest that the second layer from 50-1/5 case depth (or 200) μm contains carbon in a total amount comprising a range of 1.0-1.6 wt%, an amount of residual austenite comprising a range of 20-35 vol.%, and a surface hardness comprising a range of 64 or higher in Rockwell C hardness.

Goto '869 and '390 clearly teaches away from Applicant's claimed invention by disclosing the second layer having a 0.75-1.3 wt% content of carbon, and residual austenite content of 25-45%.

Therefore, Applicant respectfully requests the Examiner to reconsider and withdraw this rejection since the alleged prior art reference fails to teach or suggest each and every element and feature of Applicant's claimed invention.

B. 35 U.S.C. § 103(a) Rejection over Goto, EP 1099869 A2 further in view of Toda, U.S. Pat. No. 6,251,197

The Examiner alleges that Goto, EP 1099869 A2, (Goto '869), further in view of Toda, U.S. Pat. No. 6,251,197, (Toda), makes obvious the invention of claim 5.

With respect to the rejection of Applicant's claim 5, Applicant submits that Goto '869 would not have been combined with Toda and even if combined, the combination would not teach or suggest each and every element of the claimed invention, since neither Goto '869 nor Toda teach or suggest, "a roller member comprising: high carbon chromium bearing steel having a carburization treatment, said bearing steel comprising: a surface portion defined as a range between a surface of a rolling face of the roller member to a depth where a maximum shearing stress acts thereon, said surface portion containing carbon in a total amount comprising a range of 1.0 to 1.6 wt% and an amount of residual austenite comprising a

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range of 20 vol% to 35 vol%,” and “wherein a surface hardness of said surface portion comprises a range of 64 or higher in Rockwell C hardness.”

Toda is directed towards a rolling or sliding part comprising a steel material subjected to a heat treatment including carburization and containing a spheroidal carbide precipitated and dispersed in a carburized layer matrix, the particle-to-particle distance of the spheroidal carbide being up to 15 μm in terms of the distance between the most proximate particles.

Toda therefore fails to overcome the deficiencies of Goto '869.

Therefore, Applicant respectfully requests the Examiner to reconsider and withdraw this rejection since the alleged prior art references (alone or in combination) fail to teach or suggest each and every element and feature of Applicant's claimed invention.

III. THE NONSTATUTORY OBVIOUSNESS-TYPE DOUBLE PATENTING REJECTION

Claims 2 and 5 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 5 of Application No. 10/293,368 as amended on April 14, 2006.

Applicant respectfully traverses this rejection for the following reasons. Claim 2 of Applicant's instant application recites, “a rolling face of the roller member,” which is not taught or suggested by whereas, Claim 5 of U.S. Patent Application No. 10/293,368. Indeed, claim 5 of the '368 application simply discloses, “a rolling, sliding part.”

Therefore, Applicant respectfully requests the Examiner reconsider and withdraw this rejection since claim 5 of Application No. 10/293,368 fails to teach or suggest each and every element and feature of Applicant's claimed invention.

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IV. FORMAL MATTERS AND CONCLUSION

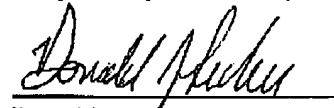
In view of the foregoing, Applicant submits that claims 2 and 5, all of the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

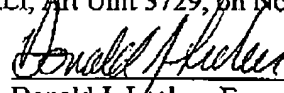
Date: November 9, 2006


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CERTIFICATE OF TRANSMISSION

I certify that I transmitted via facsimile to (571) 273-8300 the enclosed Amendment under 37 C.F.R. § 1.116 to Examiner AFZALI, Art Unit 3729, on November 9, 2006.


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